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FIRE IN LONGLEAF PINE FORESTS

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* - This series of publications releases data gathered in connection with investigations being carried on at the Southern Station. The information contained in them is subject to correction or amplification following further investigation. - Editor

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If the natural reproduction of longleaf pine as a major component of future stands of southern pine is desired, the use of fire in forest management must be seriously considered. The following statements represent the present opinion of the Southern Station on this question.

Burning off a heavy grass "rough" in advance of seed-fall of longleaf pine over an extensive area assists in obtaining a heavier initial stand of reproduction. Under many conditions the other southern pines (slash, shortleaf and loblolly), which often grow in mixture with longleaf, are better able than longleaf to establish themselves on unburned land. So many factors influence the survival of pine seedlings that good germination cannot assure satisfactory survival. Where annual or periodic winter fires occur they kill a large proportion of the slash and loblolly pine seedlings present. Shortleaf pine seedlings subjected to fire are killed back to the ground; some of them sprout, particularly those between one and eight feet in height.

For longleaf pine seedlings, the period of greatest susceptibility to fire comes immediately following germination in the fall or early winter; the seedlings succumb if touched by fire while in the cotyledon stage. Some seedlings in this stage survive fire because of being favorably located, as between clumps of grass or behind logs, or because fires do not ordinarily burn 100 percent of any area. After their first growing season, a considerable proportion of longleaf seedlings can survive annual or periodic winter fires. Where the brown-spot needle disease (*Septoria acicola*) is severe on longleaf seedlings winter fires over extensive areas reduce infection for one season and often to a lesser degree for a second season. This disease does not seriously affect the development of longleaf seedlings after they reach a height of two feet. It is negligible on the other southern pines and in many localities is not serious on longleaf.

Growth of longleaf pine seedlings is retarded by annual winter fires, the degree of retardation depending on the quality of the site and the degree of defoliation caused by the fire. If fire is kept out for several years, excessive competition from other vegetation, or severe infection by the brown-spot needle disease, may have an equally severe retarding effect on longleaf seedling development.

¹These notes on fire are extracted from a longer statement which appeared in the 12th Annual Report of the Southern Forest Experiment Station (April 27, 1933) pp.7-10. They represent the consensus of qualified opinion of the Southern Station.

After they reach sapling size, longleaf as well as the other principal southern pines apparently can be subjected to controlled fires with very little mortality, except where the undergrowth or ground cover is dense or high. Under normal weather conditions, fires during the late spring, summer, and fall months are much more damaging to forest growth than those during the winter, or dormant, season. Under complete absence of fire the accumulation of litter and ground cover, and hence the fire hazard, increases gradually up to 5 or 10 years. If underbrush is present the fire hazard may increase even beyond 10 years.

It is customary in naval stores operations to rake around each turpentine tree and burn off the accumulated litter and grasses annually, to insure against accidental burning at other times when fire might have disastrous effect. The protective effect of any single fire does not last much beyond the growing season immediately succeeding the fire, particularly where grass forms the bulk of the fuel. Such use of fire for protective purposes in the pure longleaf pine forest is clearly advisable where thoroughly dependable and adequate fire protection cannot otherwise be obtained. Fire causes particularly severe damage in stands being turpentineed where the trees have not been carefully protected by raking and in stands that have been worked out and abandoned for turpentineing.

Mature pine stands may be injured by fire-scarring as a result of repeated fires, and by loss of entire trees through the cumulative effect of repeated fires and contributing factors (insects, disease, drought, wind, etc.)

In emphasizing the destructive effects of fires, the beneficial effects (both actual and potential) commonly have been ignored. Fire should be used as a tool only with a thorough working knowledge of all local factors. The proper use of fire in longleaf pine forests requires judgment as to when and how to burn for silvicultural or management purposes. As no single set of specific recommendations will fit all conditions, burning procedure must be worked out for individual tracts. Species and size of trees, density of stand, amount and condition of fuel, and probable costs must be considered. Knowledge of these factors and an adequate organization for fire control are clearly essential. Without them fire is a poor servant. The growing of successive crops of longleaf on a commercial basis requires mastery of all aspects of the fire situation, not the least of which is the proper use of fire as a silvicultural and protection tool.

Controlled Burning

Although the Southern Forest Experiment Station is studying the effects of PERIODIC silvicultural burning of southern pine stands, no conclusive results have yet been attained. However, many years of close observation of the results of COMPLETE EXCLUSION of fire over long periods of time and of ANNUAL BURNING as commonly practiced in the South, have shown that neither of these procedures is entirely satisfactory in growing longleaf pine. This experience strongly indicates that some intermediate course, utilizing fire in moderation, may prove best. Precisely when, where, and how to attempt the moderate use of fire is a serious local problem and one on which additional research and field trials are needed.

A revised conception of the fire problem of the southern pine region is needed and is inevitable in the light of recent observation and experiments. This statement must not be interpreted as universally applicable throughout the southern pine region, nor in any sense complete or final.

Controlled burning for forestry purposes means careful burning of a predetermined area, according to a prearranged plan, by men trained in the use and control of fire. The controlled use of fire need not to be restricted to the disposal of logging slash or to the clearing of fire lanes. With discrimination, fire may be used during the dormant season for definite constructive purposes, such as promoting the regeneration of longleaf pine, benefiting forest range, or reducing the likelihood of a conflagration like the 17,000-acre Cogdell, Georgia, fire of last spring. Controlled burning is not to be considered as a substitute for fire protection, but rather as an important tool which may be used to advantage under certain conditions in the management of longleaf pine forests.

The benefits of controlled burning must be weighed against its costs. In considering costs, an important item is fire damage, including the unavoidable damage caused by the controlled burning itself. On the credit side, the probable reduction in size, frequency, and destruction of unwanted fires should be taken into account. Some actual damage can be justified as a part of the cost of fire insurance.

Cost records of controlled burning are meager. Data gathered by the Southern Forest Experiment Station in Louisiana, Mississippi and Florida indicate that the cost per acre for controlled burning decreases as the area burned increases and is very high for small areas. For areas of 100 acres or more, there is little variation in the cost per acre. Slightly less than 0.1 man hours per acre was found to be sufficient to safely set and control these larger fires. At twenty-five cents per hour for labor, the cost is from one to three cents per acre. Although this result was consistent for burns in very different fuels and under varying conditions, it should be considered as tentative only. Furthermore, controlled burning may be done without any extra cost if it can be handled by the regular protective organization. Unskillful burning naturally results in exorbitant costs, scant benefits, or much damage. Further tests are needed to obtain accurate costs.

Controlled burning in no way eliminates the need for fire protection measures. It may, however, prove to be a valuable supplementary aid in the silviculture, management, and protection of longleaf pine forests. It promises to be useful as an economical means of hazard reduction, should make the fighting of unwanted fires easier, and should reduce the probability of periodic large scale losses due to conflagrations during seasons of severe fire weather.

To promote these ends and to test further the ideas set forth in this article, the Station's experiments are designed to determine the details of procedure, costs, and results in the use of controlled fires. At present the use of periodic light controlled burning for longleaf pine gives promise of favorable results

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